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**Bioinformatics and Systems Biology - Compulsory (24 ec for all + 18 ec 'profile')**

- **Fundamentals of Bioinformatics (6ec)** VU + UvA X_405052
- **Algorithms in Sequence Analysis (6ec)** VU X_405050
- **Biosystems Data Analysis (6ec)** VU X_405061
- **Structural Bioinformatics (6ec)** VU X_405019
- **Bioinformatics for Translational Medicine (6ec)** VU X_405092
- **Advanced Modeling in Systems Biology (6ec)** VU X_418155

- **Introduction to Systems Biology (6ec)** VU + UvA X_428565
- **Basic Models of Biological Networks (6ec)** VU X_418154
- **Systems Biology in Practice (6ec)** UvA 5304SBIP6Y
- **Statistics with R (6ec)** # VU X_418156

One out of Proposal Writing (VU - 6 ec) or Thesis Writing (UvA - 6 ec). Both are individual work that can be flexibly planned at the end of the first year, or during the second year.

**Optional Recommended Courses**

- **Signal Transduction in Health and Disease (6ec)** VU X_432535
- **Computational Biology (6ec)** UvA 5284COBI6Y
- **iGEM (30ec)** -- continues after period 6
- **Machine Learning (6ec)** VU X_400154
- **Data Mining Techniques (6ec)** VU X_400108
- **Machine Learning f/t Quantified Self (6ec)** VU XM_40012

**Preparatory Bachelor Courses (assigned to address deficiencies; max 6 ec)**

- **Calculus (6ec)** VU X_400617
- **Introduction to Programming (Python) (6ec)** VU X_401096
- **Lineaire algebra 2 (3ec)** VU
- **Natuurkunde & Gezondh. (3ec)** VU

**Optional Courses Other Masters (may also be taken in second year, if necessary)**

- **Genomes and Gene Expression (6ec)** VU AM_470614
- **Stochastic Simulation (6ec)** UvA 5284STSI6Y
- **Understanding Molecular Simulation (6ec)** UvA
- **Scientific Computing (6ec)** UvA 5284SCCO6Y
- **Deep Learning (6ec)** UvA 5204DLFV6Y
- **Complex System Simulation (6ec)** UvA 5284COS6S6Y
- **Evolutionary Computing (6ec)** VU X_400111
- **Applied Machine Learning (6ec)** UvA 5294APML6Y
- **Biomolecular Simulation (6ec)** UvA 5254BIS6Y
- **Computational Biology (6ec)** UvA 5284COBI6Y
- **High Performance Computing & Big Data (6ec)** UvA 5284HPCB6Y
- **Software Architecture (6ec)** VU X_400170
- **Scientific Computing and Programming (6ec)** UvA 52548SCP6Y

**Key:**

- **Compulsory**
  - First year:
    - 42 ects are compulsory:
      - 24 ects are compulsory for all students
      - 18 ects differentiate between the Bioinformatics and Systems Biology profiles
    - 18 ects are can be chosen freely.
  - Choose one out of Advanced Modeling in Systems Biology or Statistics with R

- **Bioinformatics Profile**
- **Systems Biology Profile**
- **Recommended Optional Courses**
- **Supplementary Courses**
- **Optional Courses**

- **Second year:**
  - 60 ects of projects:
    - Major (max. 42 ects) must match profile (Bioinformatics or Systems Biology)
    - Minor (min. 18 ects)